Costing ICs

April, 2006

Life-Cycle Cost Guidance

- Conducted a workgroup in 2001
- Developed an Information Collection Request in 2002
  - Sent to all 50 States
  - 200 local agencies
  - Other Federal Agencies
- Conducted a Regional Call
  - Followed up with interviews
- Significant data gaps
  - Made assumptions
  - Empirical data and BLS estimates

Life Cycle Costing

- Life Cycle Costing (LCC) is a standard analytical method that calculates the total cost of an investment project or activity over its lifetime.

- There are a number of important components to LCC:
  - Cost - before performing the LCC analysis, all relevant costs associated with an IC must be compiled.
    - One-time & recurring
  - Time - the study period is the period of time over which IC expenses are to be evaluated
  - Discount rate – a reflection of the time value of money

Discounting and Net Present Value

- The LCC approach takes into account the time value of money - the variation in the cost of an expenditure caused by when it accrues.
- Because costs expended at different times have different values, activities related to IC mechanisms cannot be directly compared or summed.
  - Costs must be converted into their time-equivalent value.
  - This time-equivalent value is referred to as the Present Value (PV) of the costs.

Table 3c – Cost Estimate Elements for Informational Controls

Mechanisms:	Advisories/ Notice	Deed Notice	IC Database	MOU	One-Call	RfR Determination	Category Average	Percent of Average
Life Cycle Phases:								
Planning	$9,231	$5,039	$5,039	$5,039	$847	NA	$5,039	18%
Design	$4,837	$3,263	$39,590	$1,768	$1,271	$4,301	$9,172	32%
Implementation	$6,885	$1,095	$12,938	$1,964	$5,002	$1,613	$4,916	17%
Monitoring	$1,538	$945	$6,632	$1,242	$7,550	NA	$3,581	13%
Reporting	$4,151	$1,772	$5,330	$3,751	$3,751	NA	$3,751	13%
Enforcement	NA	$131	NA	NA	$4,011	NA	$2,071	7%
Termination	NA	NA	NA	NA	NA	NA	NA	NA

A shaded cell indicates the presence of IC cost data derived through imputation i.e. a missing value derived from the existing data for similar mechanisms.

These cost estimates represent annual unit costs for each IC phase – that is, regardless of whether it is a single activity (e.g., enforcement) or a series of activities (e.g., IC planning) in a given year, the cost estimate represents the total annual cost to carry out that life cycle phase.

Table 3b – Cost Estimate Elements for Governmental Controls				
IC Mechanisms:	Building Codes	Groundwater Ordinances	Permits	Zoning	Category Average	Percent of Average
Life Cycle Phases:						
Planning	$45,832	$9,231	$45,832	$10,149	$27,761	26%
Design	$25,207	$2,573	$25,207	$13,990	$16,744	16%
Implementation	$45,832	$10,658	$43,764	$24,206	$31,115	29%
Monitoring	$24,456	$2,109	$18,644	$29,539	$18,687	17%
Reporting	$4,697	$8,970	$424	$4,697	$4,697	4%
Enforcement	$11,000	$2,201	$6,761	$6,839	$6,700	6%
Termination	$1,928	$1,928	$1,928	$1,928	$1,928	2%

A shaded cell indicates the presence of IC cost data derived through imputation i.e. a missing value derived from the existing data for similar mechanisms.

Table 3a – Cost Estimate Elements for Proprietary Controls									
IC Mechanisms:	Covenants		Easements		Env. Use Restriction		Category Average		Percent of Average
Life Cycle Phases:									
Planning	$6,485		$1,472		$3,978		$3,978		16%
Design	$2,074		$11,454		$850		$4,793		19%
Implementation	$3,171		$60		$1,307		$4,538		18%
Monitoring	$1,364		$13,088		$227		$4,893		19%
Reporting*	$4,697		$4,697		$4,697		$4,697		18%
Enforcement	$2,349		$1,250		$1,799		$1,799		7%
Termination	$794		$794		$794		$794		3%

A shaded cell indicates the presence of IC cost data derived through imputation i.e. a missing value derived from the existing data for similar mechanisms.

* Due to the absence of Reporting data for Proprietary mechanisms, the average of the Reporting costs for Government mechanisms was used here.

Using the Cost Estimate Data

Sample Costing Worksheet: Covenants

Phase	Year	Cost Estimate from Table	Discount Rate	NPV of Phase Cost	Phase Subtotal	Total Net Present Value
Planning	0	$6,485	7%	6,485		
	1	$6,485		6,060.33	12,544.89	
Design	2	$2,074		1,811.78	1,811.78	
Implementation	2	$6,533		2,769.31	2,769.31	
Monitoring	3	$1,364		1,113.41		
	8	$1,364		793.85		
	13	$1,364		566.00		
	18	$1,364		403.55		
	23	$1,364		287.73		
	28	$1,364		205.15	3,369.69	
Reporting	3	$4,697		3,948.72		
	8	$4,697		2,815.38		
	13	$4,697		2007.33		
	18	$4,697		1,431.20		
	23	$4,697		1020.42		
	28	$4,697		727.55	11,950.61	
Enforcement	8	$2,349		1,366.87		
	15	$2,349		851.22		
	22	$2,349		530.10		
	29	$2,349		330.12	3,078.30	
Termination	30	$794		104.28	104.28	
Total						**$35,628.86**

Sum of Life Cycle Phases Versus Total Life Cycle Cost

The cost examples below illustrate the difference between simply adding the numbers presented in the Cost Estimate Element Tables and actually calculating the net present value for the total life cycle cost of the IC. The data below are for a hypothetical covenant.

Sum of the Life Cycle Phases	
Planning	$6,485
Design	$2,074
Implementation	$3,171
Monitoring	$1,364
Reporting	$4,697
Enforcement	$2,349
Termination	$794
Total	**$20,933**

NPV of Total Life Cycle Costs	
Planning	$12,545
Design	$1,811
Implementation	$2,769
Monitoring	$14,460
Reporting	$44,312
Enforcement	$3,078
Termination	$104
Total	**$79,080**

Do not simply sum all 7 phases

Monitoring as a Cost Driver

The following calculations show two different cost estimates for an easement. Both scenarios assume that the easement will be in place for 30 years and then terminated. Example on the left assumes monitoring and reporting every 5 years. Example on the right assumed monitoring and reporting every year for 30 years

Monitoring & Reporting every 5 years	
Planning	$2,849
Design	$10,004
Implementation	$52
Monitoring	$32,336
Reporting	$11,952
Enforcement	$1,638
Termination	$104
Total	**$58,935**

Annual Monitoring & Reporting	
Planning	$2,849
Design	$10,004
Implementation	$52
Monitoring	$138,750
Reporting	$150,014
Enforcement	$1,638
Termination	$104
Total	**$303,412**

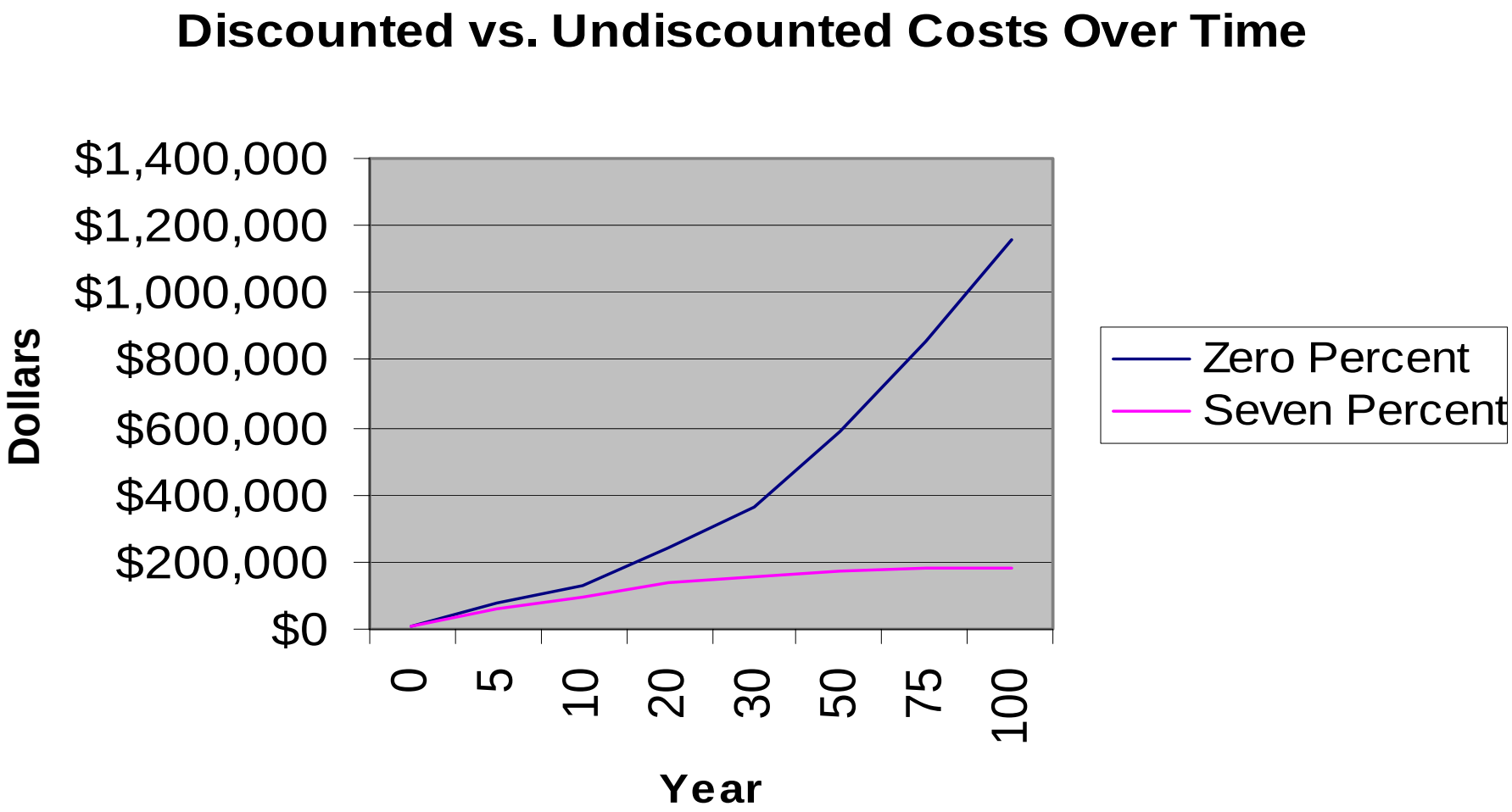
Sensitivity Analysis and Discount Rates

The following table contains comparative NPV calculations are for a hypothetical groundwater ordinance that remains in place for 30 years.

Discount Rate:	**0%**	**4%**	**7%**
Planning	$18,462	$18,107	$17,858
Design	$2,573	$2,379	$2,247
Implementation	$10,658	$9,854	$9,309
Monitoring	$12,657	$7,284	$5,211
Reporting	$53,819	$30,974	$22,160
Enforcement	$8,805	$4,465	$2,885
Termination	$1,928	$594	$253
Total	**$108,902**	**$73,657**	**$59,923**

Discount Rate Comparison

Non-discounted (0%) versus discounted (7%) cost for use of a hypothetical groundwater ordinance over 100 years.



Life-Cycle Cost Guidance (Cont.)

- Expect controversy
  - Budgeting assumptions
  - Financial assurance
  - Other (social) cost discussion
- Headquarters Review beginning in March
- Regional Review beginning in June
- Anticipate bumpy peer review

Costing ICs

- Open discussion